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THE SYNONYMY, VARIATION, AND DISTRIBUTION OF THE SONORAN SKINK, *EUMECES OBSOLETUS* (BAIRD AND GIRARD)[1]

BY CHARLES E. BURT

THE Sonoran skink, *Eumeces obsoletus,* although abundant in some parts of its range, is in general but imperfectly known to herpetologists. This is due to its absence from both coasts of the United States, and consequently from certain large collections, and also to the open question of the relationship of its young to the form which has been designated and described as the little white-spotted skink, *Eumeces guttulatus.* In connection with his work on the lizards of Kansas it became evident to the writer that only by the examination of a large series of specimens could the status of these species be determined.

During the course of this study specimens have been obtained from numerous institutions[2] and individuals, and to

[1] Contribution from the Zoological Laboratory of the University of Michigan.

[2] The names of museums referred to in this paper are abbreviated as follows: U.S.N.M., United States National Museum; Univ. Mich., Museum of Zoology of the University of Michigan; M.V.Z.U.C., Museum of Vertebrate Zoology of the University of California; M.C.Z., Museum of Comparative Zoology; A.M.N.H., American Museum of Natural History; Okla. Univ., Museum of Zoology of the University of Oklahoma; and F.M.N.H., Field Museum of Natural History.

these the writer wishes to express his appreciation. Assistance has been obtained from C. D. Bunker of the Kansas University Museum; Dr. Leonhard Stejneger and Doris M. Cochran of the United States National Museum; Dr. Minna E. Jewell and Dr. Robert K. Nabours of the Kansas State Agricultural College; Dr. G. K. Noble of the American Museum of Natural History; Dr. A. I. Ortenburger of the Museum of Zoology of the University of Oklahoma; Director D. C. Davies and Karl P. Schmidt of the Field Museum of Natural History; Dr. Thomas Barbour and Arthur Loveridge of the Museum of Comparative Zoology; Dr. Charles L. Camp and Dr. Joseph Grinnell of the Museum of Vertebrate Zoology of the University of California; Dr. Alexander G. Ruthven and Helen T. Gaige of the Museum of Zoology of the University of Michigan; Professor Junius Henderson of the University of Colorado; Dr. Edward H. Taylor of the University of Kansas; and V. H. Householder, H. K. Gloyd, W. H. Burt, William R. Thompson, Stephen T. Egan, H. H. Schwardt, Howard Shaffer, and May Danheim Burt.

Eumeces obsoletus (Baird and Girard)

Plestiodon obsoletum Baird and Girard, 1852. (Type locality, Valley of the Rio San Pedro, tributary of the Rio Grande del Norte, Texas.) Proc. Acad. Nat. Sci. Phila., 6: 129.

Lamprosaurus guttulatus Hallowell, 1852. *Ibid.*, 6: 206. (Type locality, Fort Fillmore, below Jornada del Muerte, New Mexico.)

Eumeces obsoletus Cope, 1875. Bull. U. S. Nat. Mus., 1: 45.

Eumeces guttulatus Cope, 1875. *Ibid.*, 1: 45.

The present views of the writer are adequately expressed by this synonymy.

Although *Plestiodon obsoletum* Baird and Girard and *Lamprosaurus guttulatus* Hallowell were described in the same publication and in the same year, the former is given preference here because of its page priority.

The rather indefinite original description of *Plestiodon obsoletum* is very short: "Total length about nine inches. Body and limbs rather stout; tail longer than body, conical,

and rapidly tapering away . . . general color greenish white; uniform below; the scales on the back and sides are thinly marginated with black." The original description of *Lamprosaurus guttulatus* is, however, longer, and includes much detail that would apply equally well to other common American skinks. The more important characters given are as follows: "Body and upper surfaces of extremities black; a row of seven or eight white spots along the margin of the upper jaw; a row of white spots along the inferior margin of the supra-orbital plates, continuous with which is a white spot upon the fronto-nasal, and another upon the parietal plates; the rest of the upper surface, sides and front part of the head, are jet black . . . total length two inches six lines." The type of *obsoletus* is, therefore, a medium-sized adult, and the type of *guttulatus,* the newly hatched young.

It is significant that Hallowell in 1857 mentioned two Hammond specimens of his then recently described species, *guttulatus,* from Kansas. One of these was larger than the type, having attained a length of three inches four and one-half lines. Later Cragin (1881) reported a specimen from Manhattan, Kansas.

The concise wording of the apparently successful attempt of Cope (1900) to separate *guttulatus* specimens from those of *obsoletus* has influenced various later writers, particularly Van Denburgh (1922). Cope's distinctions are worthy of discussion, since they were made with both types available to him, and since they in no way offer data contrary to the wording of the original descriptions.

Cope used three chief points of separation for the "young" of the two forms, each of which will be considered here.

The first distinctive character was the appearance of five faint lines on the back of *obsoletus,* and their total absence in *guttulatus.* The presence of five light lines (often of varying intensity) on the back and sides is a condition met with many times in the study of the genus Eumeces. Thus, Cope's report (1900: 646) of *guttulatus* from Gila River, Arizona (U. S.

N. M., No. 9231), is based on a young and mutilated specimen of *fasciatus.* It is evident that this is the case because the body of the specimen has five distinct (not obsolete) lines, the center one of which bifurcates on the head, and in addition the lateral are parallel to the dorsal and ventral scale rows instead of diagonal, as in *obsoletus* and *guttulatus.* It is true that five faint lines do occur on the back of certain specimens of *obsoletus* (*guttulatus*). The newly hatched young are usually typically unicolor above, the lined effect appearing when the center of all the dorsal scales becomes light as the specimen grows older. The size at which this transformation takes place and its extent vary greatly. In a series of fifty young and medium-sized Kansas specimens, which are now in the Kansas University Museum, some with the lighter coloration have lines, but by far the larger number have little or no trace of striping. Even in adult specimens both dark and faded patterns occur, though the light centers of the dorsal scales are always apparent and the lines are either irregular, interrupted, or totally absent.

The white spots on the labials of *guttulatus* were said by Cope to be totally closed beneath by black, and those of *obsoletus* to be entirely open or white beneath. It is apparent that only the upper labials are to be considered. The examination of even a small series of these skinks shows that this distinction does not hold. The newly hatched young usually present the characteristic closed condition (Univ. Mich., No. 65003), but before long the anterior labials lose their ventral blackness, and an intermediate condition is reached (Univ. Mich., No. 65002), and finally, all the white labial spots open below (Univ. Mich., No. 65005). The latter state is characteristic of most adults, though in some which were examined the posterior spot had not yet lost its ventral black border.

Cope also attributed two short lines of white spots on each side of the neck to *guttulatus,* as opposed to the sparse spotting of *obsoletus.* This distinction is the weakest, for the real condition shown by a large series of individuals is one of wide

variation in both the position and the extent of the lateral spotting.

According to Cope, the adults of *guttulatus* and *obsoletus* agree in the change of color (which becomes more olivaceous above with increasing age, each scale showing a dusky margin), the nature of the head scutellation, the number of scale rows around the body, and the comparative length of the fifth and second hind toes. His main basis of separation was whether the hind leg applied twice forward reaches the ear (*guttulatus*), or whether it reaches only the anterior part of the insertion of the forearm (*obsoletus*). Comparative measurements of the legs of a considerable series of North American lizards has convinced the writer that the leg is a variable member, and doubly so when compared with another variable, such as length of body. A series of five specimens has been selected to test the distinction given above. The smallest (Univ. Mich., No. 65001), with a body length of 37 mm., identifies *exactly* as an example of *guttulatus*; three others (Univ. Mich., Nos. 65002–4) are intermediate in size, and in each the application of the hind foot twice forward terminates definitely in the *intermediate* neck region, and one (Univ. Mich., No. 65006) with a body length of 111 mm. identifies *exactly* as an example of *obsoletus*. Thus, a proportionately greater elongation of the body as the animal ages gradually reduces the value of the hind leg as applied twice forward by this distinction.

Though to many workers (Ditmars, 1915, *et al.*) *guttulatus* has been considered a diminutive skink, Cope stated that "In regard to the very largest specimens I have no means of deciding whether they are really *obsoletus* or *guttulatus*. . . . One of these from Matamoras, Cat. No. 3151, is the stoutest North American skink that I have ever seen."

A difficulty in positively distinguishing very large males of *obsoletus* from those of the eastern *fasciatus* becomes evident in the intermediate region of Texas, Oklahoma, Kansas, New Mexico, and Arizona, where both species are found. The

specimen listed under *obsoletus* by Cope (1900: 650) from Matamoras (U. S. N. M., No. 9220) is probably *fasciatus*, because of its parallel lateral scale rows and prominent, bulging, reddish cheeks. The coloration is precisely like that of the adult *obsoletus* as is that of the large male specimens of *fasciatus* from Louisiana, Florida, and other eastern localities which are not within the range of *obsoletus*.

Although later writers have done little more than quote Cope and give locality records, Stejneger and Barbour (1917) inserted a footnote for *E. guttulatus* which reads: "Possibly the young of *E. obsoletus*." In the second edition of their check-list (1923), these authors removed this clause from their work and apparently recognized the two forms as independent species.

Variation.—The following table has been compiled to present data on the variation of certain characters of *E. obsoletus*. It is based upon the examination of a total of three hundred specimens, including a liberal number of both young and adults, of which fifty hind legs were measured.

Table of measurements for E. obsoletus

Measurement in mm.	Minimum	Maximum
Length of body	29	130
Length of tail	35	200
Total length	66	330
Width of head	4.5	20
Length of hind leg	14	38

Among one hundred and fifty specimens examined for the character of the mental scutellation under the chin, a total of one hundred and thirty-nine had two transverse mentals (Fig. 1), and eleven had but one. The single mental of one of the latter examples was partly divided from the sides (Fig. 2), however, and that of another was extremely narrow, because the posterior mental which is usually present had divided medially (Fig. 3). Usually a single, somewhat square mental is formed by the disappearance of the suture between the common anterior and posterior mentals (Fig. 4).

That the character of the postnasal scutellation varies much more than that of the mental is indicated by the fact that among fifty-five specimens examined thirty-three had one postnasal (Fig. 5), and twenty-two had none (Fig. 6). Anterior and posterior loreals are always present.

The following summary of the characters of *E. obsoletus* has been prepared from a representative series of the Sonoran skink, which has been deposited in the Museum of Zoology of the University of Michigan under the numbers 65001–65006.

Description.—Head not distinct from elongated, subcylindrical body; largest diameter at center of body; tail long and tapering in perfect specimens, but usually short or partially regenerated; supra-oculars large; tympanum exposed in young, sunken in adult; gular fold absent; all scales smooth; ventral and dorsal scale rows longitudinal; lateral scale rows oblique (unlike those of specimens of *E. fasciatus, anthracinus, pluvialis, multivirgatus, septentrionalis, brevilineatus,* and *pachyurus,* which have been examined); legs thick and rather short, especially in the adult.

Coloration varies greatly between young and adult stages; ventral color of *young* blackish, slate or olivaceous; dorsal color coal black to light gray; back with or without five faint, almost obsolete, light lines; sides of intermediate coloration; tail brilliant blue as in most other young Eumeces; head scales usually shiny black or with white spotting; white spots on labials may be with partial, complete, or no enclosing black margins; head with or without white spot back of ear opening; neck with or without lateral white spots. As the specimen *grows older,* the coloration becomes lighter, the distinct white spotting on the head and neck is lost, and the dark scutellation (especially that on the back) changes from scales with a solid color to those with a dark edge and a light spot in the center. *Adult* ground color varies from blackish to light gray or olivaceous; ventral parts light to slate, often yellowish; lower labials and under parts of the upper labials nearly or entirely white.

Distribution.—Various authors have reported both *E. obsoletus* and *E. guttulatus* from the same locality. Stejneger and Barbour (1923) gave the range of *obsoletus* as "Utah and Kansas southward to northern Mexico," and that of *guttulatus* as "Western Texas and Oklahoma to Arizona." It is of interest to note that the range given for *guttulatus* is entirely within that of *obsoletus.*

Although reports of *guttulatus* have appeared outside its check-list limits, these too have been wholly within the recorded range of *E. obsoletus.* The range of *obsoletus,* as defined in this paper, may be discussed as follows:

Arizona.—A number of state reports based on specimens in the United States National Museum with no further data have appeared in the past (Yarrow, 1875; Van Denburgh and Slevin, 1913; etc.). Others with generally unknown or indefinite localities, such as Gila River and Cave Spring (Yarrow, 1875) and Ash Creek (Cope, 1900), should be discarded. This applies also to obscure records from early military posts, such as Fort Whipple (Coues, 1875) and Fort Grant (Van Denburgh, 1922). Apparently definite reports for the occurrence of *E. obsoletus* in Arizona are confined to the following: Cochise County (M. V. Z. U. C.; M. C. Z.; A. M. N. H.); Tuscon, Pima County (Cope, 1900); and Prescott, Yavapai County (Cope, 1900).

Colorado.—A general report for the state of Colorado was given by Yarrow (1875). Records of Ellis and Henderson (1913) are: Wellington, Larimer County; Las Animas County; and Osgood and Greeley, Weld County.

Kansas.—With the exception of *Cnemidophorus sexlineatus,* the Sonoran skink is the most widely distributed lizard of the Kansas area. It has been obtained in thirty-six of the one hundred and five counties of the state, and representative specimens now at the University of Kansas or the Kansas State Agricultural College support most of these records. Other examples have been deposited in a number of the leading museums, particularly in the Museum of Zoology of the

University of Michigan, and in the United States National Museum. A full report on this Kansas material appears in the writer's paper on The Lizards of Kansas.

Map showing the distribution of *E. obsoletus* as indicated by the locality records presented in this paper

Mexico.—The available reports of *E. obsoletus* from Mexico are based on specimens deposited in the United States National Museum, all of which were collected many years ago. These are: Matamoras, Tamaulipas (Yarrow, 1882); Santa Caterina, Nuevo Leon (Yarrow, 1882); and Chihuahua, Chihuahua (Cope, 1887).

Nebraska.—The indefinite "Platte River, Nebraska" report of Cope (1900) has been cited several times by later workers. Apparently no other record of the occurrence of the Sonoran skink in Nebraska is now available, but since the writer has recently collected it in Republic, Washington and Marshall

counties, Kansas, all of which border Nebraska on the south, a future extension of its range into the southern part of Nebraska may be regarded as possible.

New Mexico.—Definite records from New Mexico are: Albuquerque, Bernalillo County (U. S. N. M.); Las Cruces and Fort Fillmore, Dona Ana County (M. C. Z.; U. S. N. M.; Hallowell, 1852); and Valencia, Grant County (U. S. N. M.). Coues reported a specimen from Bero Springs, New Mexico, in 1875.

Oklahoma.—The locality records from this state are largely due to the efforts of Dr. A. I. Ortenburger. The following reports are available: Alfalfa County (Ortenburger, 1926a); Alva, Woods County (M. C. Z.); Boise City, Cimarron County (Ortenburger, 1927); Harper County (Okla. Univ.); Kay County (Ortenburger, 1926a); Tulsa County (Ortenburger, 1926a); and Wichita Mountains, Comanche County (Ortenburger, 1926b).

Texas.—The apparently reliable reports of the occurrence of *E. obsoletus* in Texas are as follows: Seymour, Baylor County (Strecker, 1915); Helotes, Bexar County (Cope, 1880; Strecker, 1922); Brewster County (Strecker, 1909a); Burnet County (Strecker, 1909b); Cameron County (U. S. N. M.; M. C. Z.; F. M. N. H.); south end of the Guadalupe Mountains, Culberson County (Bailey, 1905); San Diego, Duval County (U. S. N. M.); El Paso, El Paso County (U. S. N. M.; M. C. Z.; Hallowell, 1852); Davis Mountains, Jeff Davis County (Ruthven, 1920); McLennan County (Strecker, 1915); and Wichita Falls, Wichita County (A. M. N. H.). The Sonoran skink will probably be reported from many more Texas localities in the future.

Utah.—Yarrow (1875, 1882) listed this species from the state of Utah, using as his basis a single specimen in the collection of the United States National Museum. The writer, agreeing with Van Denburgh and Slevin (1915), feels that these records are open to question until confirmed.

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PLATE I

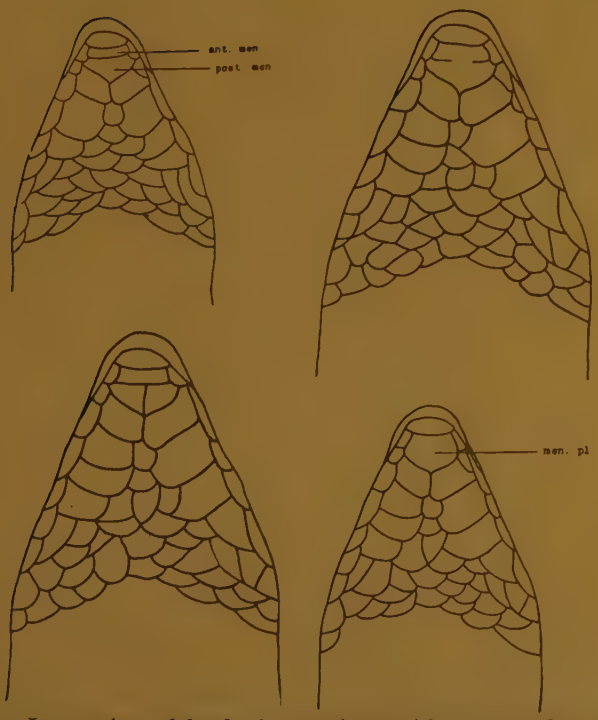

FIG. 1. Lower view of head of a specimen with two complete mental plates. (Univ. Mich., No. 65019). Ant. men. = anterior mental plate; post. men. = posterior mental plate

FIG. 2. Lower view of head of a specimen with one mental plate which is partly divided from the sides (Ottawa Univ. Mus.)

FIG. 3. Lower view of head of specimen with a single narrow mental plate, the posterior one having divided medially (Ottawa Univ. Mus.)

FIG. 4. Lower view of the head of a specimen with a single large mental plate which is formed by the disappearance of the suture between the anterior and posterior mentals (M. V. Z. U. C., No. 8084). Men. pl. = mental plate

PLATE II

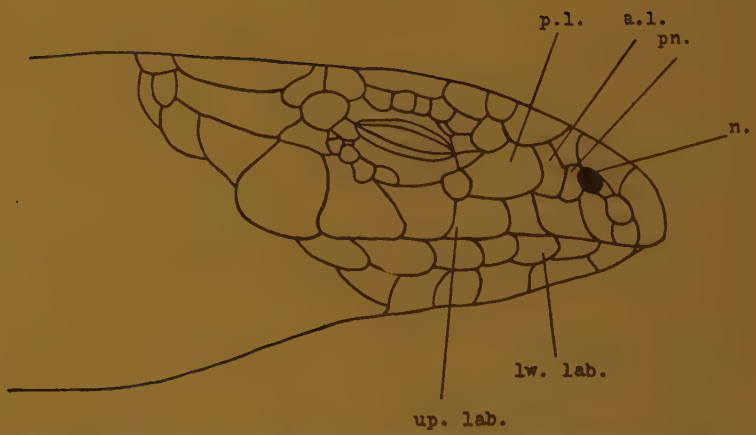

FIG. 5. Side view of the head of a specimen with one postnasal (Univ. Mich., No. 65019). P. l. = posterior loreal; a. l. = anterior loreal; pn. = postnasal; n. = nasal opening; up. lab. = upper labials; lw. lab. = lower labials.

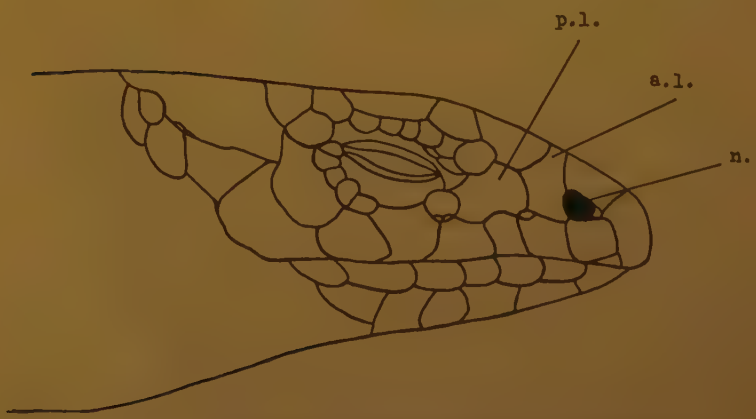

FIG. 6. Side view of the head of a specimen without a postnasal (Univ. Mich., No. 65020)

PLATE III

FIG. 7. View of a medium-sized adult and a large adult from Manhattan, Riley County, Kansas.